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ABSTRACT

This paper considers some practical concepts and ideas related to standardized test score improvement in general and specifically to the World Institute for Computer-Assisted Teaching (WICAT) Integrated Learning System (ILS) use. Previous research cited in this paper shows that, while teachers are the most important variable in ILS utilization, there are several increasing levels of teacher use of ILS labs, ranging from non-participatory, novice, practitioner, integrator, to extender. Another important issue in test improvement involves the potential match between the objectives/content of the test and the objectives/content of the material covered in class during the instructional year. This paper describes in detail both the stages of teacher use of ILS and the coverage of test material. The ILS prescription test, an approach that has not yet been tested for instructional effectiveness, is also described. It is concluded that ILSs can be powerful tools for teachers. (ALF)

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Integrated Learning Systems and Standardized Test Improvement

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RUNNING HEAD: TEST IMPROVEMENT

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Integrated Learning Systems and Standardized Test Improvement

Abstract

This position paper considers practical concepts and ideas related to standardized test score improvement in general, and then considers test improvement issues relating to World Institute for Computer-Assisted Teaching(WICAT) Integrated Learning System (ILS) use. Teacher use of an ILS is discussed first, and then test "coverage" is considered. The author suggests that teachers are the most important variable in ILS utilization.

Integrated Learning Systems and Standardized Test Improvement

Introduction

This position paper considers some practical concepts and ideas related to standardized test score improvement in general, and then considers test improvement issues relating to World Institute for Computer-Assisted Teaching(WICAT) Integrated Learning System (ILS) labs. Several years ago, WICAT Systems conducted qualitative research (see Schnitz & Azbell, 1991) in ILS labs across the U.S. to determine what conditions promote maximum learning gains. This investigation revealed that teachers are the most important variable in ILS utilization. Observation suggested several increasing levels of teacher "use" of ILS labs. These include non-participatory, novice, practitioner, integrator, and extender.

A second important issue in test improvement involves coverage of material. Part of coverage includes the potential "match" between the objectives/content of the selected standardized test, and what is actually covered during the instructional year. Of course, the district syllabi may not match the national test selected. In such a case, lower test scores are an inevitable result. The learning environment created by the teachers use of an ILS will be covered first, then test "coverage" will be discussed.

The Stages of Teacher Use of an ILS

Five stages of teacher use have been suggested, ranging from non-participatory to extender (see Figure 1). Non-participatory teachers "drop-off" their students, either literally or metaphorically. When a teacher is not involved in their students' learning opportunities, a "wall" exists that prevents the teacher from capitalizing on these opportunities. More importantly, the non-participatory teacher sends a non-ambiguous message that this activity is

not important. Usually in such situations, students become disinterested and little learning occurs. Discipline problems also increase. These effects can be mitigated by other interested adults (i.e., the Learning Center Manager or the Principal), however, in schools where teachers drop-off their students at the ILS lab, test scores are no better and are often worse than before the ILS was installed.

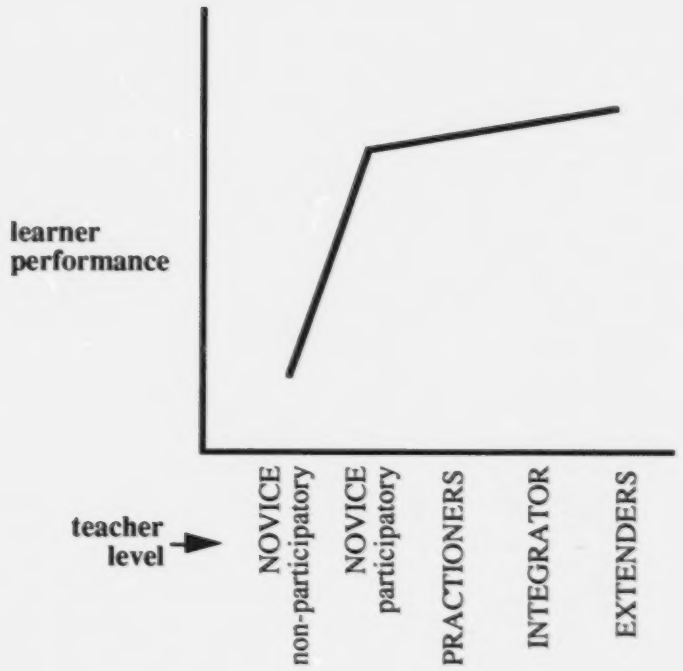

Figure 1. Hypothesized level of learner performance under each instructional condition.

Novice teachers may produce a learning environment similar to non-participatory teachers, not because of lack of interest in their students' learning, but because of lack of knowledge. The transition from novice to higher stages depends impart on teacher desire, but opportunity to use the system is critical. As teachers come to the ILS lab with their

students, they will begin to learn the curriculum just by helping their students in the lab. However, it will obviously take a full school year to get to know the different curriculum areas in this way. To speed the process, teachers could be given time in the lab when their students are not there to "play" with the available instructional options, to get to know the curriculum content in the various subjects, and to explore progress reports and how to use each type.

However, lack of knowledge about the ILS programs is a separate issue from establishing a positive learning environment. The student-instructor interaction established in an ILS lab is a critical variable in learning gains for both younger children (Clariana, 1990) and adults (Stephenson, 1992). The ILS lab environment usually mirrors the classroom environment, and very often, this dynamic either positive or negative has filtered down from the principal's office. A dysfunctional lab usually means a dysfunctional classroom, and vice-a-versa. Teacher attitude is a complex issue. Training may help. Also coaching and mentoring by lead teachers and by administrators can help. The introduction of an ILS lab into a school can serve as a cornerstone or as an impetus for change, but will not in itself cause change. Leaders can take advantage of the ILS to change the old rules. WICAT research suggests that teacher empowerment may be a cornerstone to establishing and maintaining a positive learning environment.

Given time, a novice teacher becomes a Practitioner teacher. The practitioner takes advantage of the power of "mastery learning" that is built into ILS lessons. Practitioner teachers particularly impact low-able learners. These students won't do well either in the class or the ILS lab. Practitioners use ILS progress reports to identify and help these particular students, through remediation or reteaching.

However, two curricular sequences still exist, the classroom sequence and the ILS lab sequence, and there is much overlap between the two. Research indicates that teaching material once in the classroom and once in the computer lab is more effective than either

classroom or computer lab alone (Dalton & Hannafin, 1988). Further, it doesn't appear to matter which comes first, classroom or computer. Probably, using the two different approaches (computer and classroom) and the double exposure to the same material makes the material more memorable to the learner.

On the other hand, all students don't need a double dose of everything they learn. The overlap between the teacher sequence and the computer sequence is inefficient. Though critical for some students, the upper-ability students may become bored with this constant duplication of effort. For many, learning becomes a "race" through the material. It doesn't take long before these students realize that their reward for completing an activity is to receive another activity (Streibel, 1986; 1988). At this point, student "empowerment" may become important, because these students are likely to lose motivation in the ILS lab. Disturbingly, this motivation loss may impact boys and girls differently (Clariana, 1991), to the detriment of girls. One successful approach used by some schools involves "dynamic placement". This ILS feature allows a student to "jump ahead" in the ILS standard sequence if that student scores well on several activities in a lesson. Students that are bored from trudging through the ILS standard sequence usually become motivated under dynamic placement. Additionally, they race far ahead of their actual grade level, and this has a substantial impact on standardized test scores. Eventually, they reach challenging material and slow down, but this challenge level also maintains motivation.

Integrator teachers manipulate the ILS lesson sequence so that it more closely matches or integrates with their classroom instruction. The ILS lesson sequence and the classroom sequence become more similar. There is a motivational factor when students do the same material in the classroom and in the ILS lab. Also, this situation implies that the integrator teacher has closely examined the computer material for that section and has selected just exactly what is needed. This can improve efficiency, since unuseful computer activities are not included. Also, it is easier to incorporate ILS percent scores into daily and weekly class

grades, since the computer activities directly support the current classroom unit. Grades will provide motivation for some students. Scored computer activities could be easily used as end of unit exams.

This approach also makes it easier for the teacher to reteach or remediate low-able students since everyone is doing the same set of activities, and classroom remediation can occur with a small group rather than with individuals. However, this approach will slow down the high-able group. In effect, they are "brought back" to do activities they already have passed, and so their progress into upper grade material is delayed.

Extender teachers have fully integrated the ILS curriculum and their classroom curriculum. There is one curriculum, with some topics taught only in the classroom, some only on the computer, and some on both. This results in a substantial time savings, since there is little redundancy in the lab and classroom, and increased motivation. The extra time gained can be used to "extend" the curriculum either into such areas as higher grade materials or higher-level thinking types of activities. In this learning environment, the high-able students may or may not "cover" as much content ground compared to their progress under dynamic-placement in a standard sequence. However, overall, the class average will cover more material, and so the class as a whole will score higher.

Unfortunately, at all teacher levels, there is an inadvertent unfairness. The high-able students will either go-ahead in the curriculum, or else will have more time to do generative-learning type activities like creative writing. At least, comparatively, the low-able students at will do better than with no ILS.

As teachers reach higher levels of ILS use, they will be forced by necessity to make their teaching groups smaller and smaller. To increase instructional efficiency, eventually, each student may need an individual education program (IEP). This is a fairly common approach in GED programs and at the Community College Level, and ILS systems complement IEP programs. This level of use is often difficult to achieve in mainstream

classes do to the teacher time commitment, however Chapter 1 and other special programs using ILS labs often achieve individual programs.

Test Coverage

Standardized tests are typically constructed of items covering objectives traditionally taught at the grade level intended to take that test. Some topics from lower and upper grades are included to improve discrimination. For test success, several factors must occur. (1) The teacher's syllabus should match the test, (2) the teacher can complete all of the syllabus during the year, and (3) the students remember what they have covered.

A district syllabi for a content area or an individual teacher's curriculum plan may or may not match the material in the standardized test. If there is latitude in test selection, then a different test may be selected that more closely matches the district's syllabi, thus meeting local needs. In addition though, teachers should be trained to analyze tests. At a workshop, teachers from the same grade level could complete an examination grid for the standardized test used in the district.

An examination grid consists of rows for listing the content objective of each item, and columns for assigning a ranking of some type (see Figure 2). The ranking system is used as an indication of how "deeply" the objective is tested. Usually, Bloom's taxonomy is used for ranking the test items. A synthesis level test item would be "deeper" than a fact level item, and thus students would require a deeper level of instruction to answer a synthesis question. Different content areas could use different ranking systems. For example, a science test may use the nine processes of science as ranking categories. Teachers may mark more than one ranking for a test. The important thing is not what level the question is, but rather, what must the teacher do to teach to that level. Test analysis of this type will help the teacher to understand "how wide and how deep" they much teach, if test improvement is important in the district.

item #	objective description	knowledge	comprehension	application	analysis	synthesis	evaluation
1							
2							
3							
4							
etc							

Figure 2. Sample of an Examination Grid.

Amount of time is always a limiting factor. The key, then, for test improvement is efficient coverage of material, especially into the next grade level. For test improvement to occur, some topics that a teacher always covers may not be taught. As mentioned before, the test will include material from higher grade levels. This means that the teacher must break out of a narrow mind set about what is or should be taught at each grade level. For example, teaching 2nd graders the multiplication table (a rote memory task) if it is appropriate for those students will improve their standardized test scores.

In the ILS lab, "practitioner teacher" use of dynamic placement will speed students along. The standard sequence of WICAT ILS was developed based upon current standardized tests and common textbooks. Correlations conducted by WICAT have shown an average of over 95% coverage of objectives on standardized tests. This indicates that the

WICAT standard sequence will match most tests and textbooks quite well, though of course it will also cover additional content not covered by some tests. For "LMS" WICAT schools, dynamic placement should be used.

For WICAT "AIMS" schools, lab and classroom delivery should be more completely merged to avoid redundancy when it is not required (see extender discussion above). For difficult topics, students should receive instruction in both the classroom and the lab. Also, progress reports can be used to assure mastery of the content.

ILS Prescription Tests

An efficient approach developed by WICAT is the combination of a "prescription test" with objectives parallel to a school district's national, state, or local standardized test. Computer activities are automatically prescribed based upon the learner's test performance. This amounts to an individual prescription for each student based upon their weaknesses. One implication of this approach is that students will always receive CBI activities that are difficult for the obvious reason that they will receive only those activities correlated to failed objectives on the test.

This means that the teacher will be very busy in the ILS lab, compared to normal ILS lab use. If the teacher is not present, the WCAT test with prescription approach will probably be exceptionally frustrating to the students. The instructional effectiveness of this approach has not yet been determined, though it appears to be quite promising, given the proper learning environment.

Summary

To maximize learning with an ILS, very complex questions about the type of learning environment must be answered. It would be naive to assume that an extender type

environment is best for all conditions. In an ideal world, it may be possible to create individual programs for every student, and then be able to implement every program. But schools are faced with constraints involving time, teacher training and education, teacher and student abilities, class size, and student mix to name a few.

The issue of local needs versus standardized test objectives, or even of a national examination, is beyond the scope of this essay. However, some simple procedures can be used to assure that material delivered during the year matches the school district's standardized test. The most obvious solution is to have a workshop to examine the test. Teachers involved in such a workshop will automatically adjust their teaching in-line with the test. This feedback or corrective function will be more important as tests evolve in the next decade. Computers may be used to improve test taking, allowing more than multiple-choice methods.

Also, students should be trained on test taking strategies. Certain categories of students, particularly at-risk minority students, benefit substantially from "how to take tests" courses. Some students should be allowed to practice taking tests, and some students should be given untimed tests. Currently, some college entrance tests are being delivered by microcomputer. There are obvious logistic reasons for giving timed tests, however, these will go away as more and more, standardized tests are delivered by microcomputer. At the same time, the cost of test delivery may go down, since test booklets become unnecessary. ILS systems make the ideal delivery system, since test reports can be immediately printed with prescriptions. Obviously, students could also be assigned to a diagnostic/prescriptive assignment like the Wicat prescriptions discussed above. This could substantially increase instructional effectiveness.

In summary, students will do better on tests if they know more, and if what they know is what is on the test. ILSs provide a powerful tool for teachers.

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